

CLAIMS

What is claimed is,

1. A process reinforcing a silica glass substance, the process comprising;

forming a silica glass powder layer on a surface of the silica glass substance, and

crystallizing the silica glass powder layer under a high temperature to reinforce the silica glass substance.

2. The process of Claim 1,

wherein the silica glass powder layer is a porous layer of the silica glass powder being formed on the surface of the silica glass substance by heating and sintering the silica glass powder layer under a lower temperature than the crystallization temperature.

3. The process of Claim 1 and 2,

wherein the silica glass powder layer is formed by making the silica glass powder into a slurry, coating said slurry on the surface of the silica glass substance, and solidifying the coated slurry.

4. The process of Claim 3,

wherein the slurry contains a binder.

5. The process of Claim 1, 2 and 3,

wherein the silica glass powder layer comprises the fine and coarse silica particles, wherein more than 20 weight % of all powder are the fine silica particles having smaller particle size than $10\ \mu\text{m}$, and remaining powder are the coarse silica particles having less than $150\ \mu\text{m}$.

6. A process reinforcing a silica glass crucible, the process comprising;
forming a silica glass powder layer on the whole or a part of a surface
of a silica glass crucible, and

crystallizing the silica glass powder layer on the surface of the
crucible under a high temperature to reinforce the silica glass crucible.

7. The process of Claim 6,
wherein the high temperature is given by the temperature at the melting a
silicon raw material charged into the silica glass crucible

8. The process of Claim 6,
wherein the silica glass powder layer is a porous layer of the silica glass
powder being formed on the surface of the silica glass crucible by heating and
sintering the silica glass powder layer under a lower temperature than the
crystallization temperature.

9. The process of Claim 6 and 8,
wherein the silica glass powder layer is formed by
making the silica glass powder into a slurry,
coating said slurry on the surface of the silica glass crucible, and
solidifying the coated slurry.

10. The process of Claim 9,
wherein the slurry contains a binder.

11. The process of Claim 6, 7,8 and 9,
wherein the silica glass powder layer comprises the fine and coarse silica
particles, wherein more than 20 weight % of all powder are the fine silica
particles having smaller particle size than $10\mu\text{m}$, and remaining powder are
the coarse silica particles having less than $150\mu\text{m}$.

12. A quartz glass crucible,
wherein the fine quartz glass powder layer is formed on the whole or a part
of the surface of the crucible.

13. The quartz glass crucible of Claim 12,
wherein the quartz glass powder layer is formed on the whole or in the ring
configuration on the outside surface of the crucible, or in the ring
configuration on a part of the inside surface being not contacted with a
molten silicon.

14. The quartz glass crucible of Claim 12 and 13,
wherein the silica glass powder layer on the whole or a part of the surface of
the crucible comprises the fine and coarse silica particles, wherein more than
20 weight % of all powder are the fine silica particles having smaller particle
size than $10\ \mu\text{m}$, and remaining powder are the coarse silica particles having
less than $150\ \mu\text{m}$.

15. A method for pulling a silicon single crystal, the method
comprising;

using the silica glass crucible having the silica glass powder layer on
the whole or a part of the surface of the crucible, and

crystallizing the silica glass powder layer on the surface of the
crucible under a high temperature at the time of melting the silicon raw
material being charged into the crucible, to reinforce the silica glass crucible.